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मानक

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IS 13082-2 (1991): Bulk handling equipment - Ship unloader
- Gantry mounted grab type - Code of practice for design,
manufacture and erection, Part 2 Electro-mechanical
requirements [MED 7: Material Handling Systems and
Equipment]



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Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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भारतीय मानक

शशि संचालन उपस्कर—गैन्ट्री संचालित
ग्रेब टाइप पोत—निर्भरक के डिजाइन, निर्माण
और स्थापन की रीति संहिता

भाग 2 विद्युत-यांत्रिक अपेक्षाएँ

Indian Standard

**BULK HANDLING EQUIPMENT —
SHIP UNLOADER — GANTRY MOUNTED
GRAB TYPE — CODE OF PRACTICE FOR
DESIGN, MANUFACTURE AND ERECTION**

PART 2 ELECTRO-MECHANICAL REQUIREMENTS

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NEW DELHI 110002

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Price Group 2

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Bulk Handling Equipment Sectional Committee had been approved by the Heavy Mechanical Engineering Division Council.

There are various types of ship unloaders but, main types being continuous and grab type. These could be mounted on the gantry or crawler/tyres.

Ship unloaders are important functional sub-system of unloading and transportation of bulk materials shipped.

This Part 2 is the one in the series of other parts of the standard covering the code of practice for design, manufacture and erection of gantry mounted grab type ship unloader provided with horizontal boom and grab-bucket. Other parts of the standard are:

IS 13082 (Part 1) : 1991 Mechanical and structural requirements

IS 13082 (Part 3) : 1991 Information to be supplied by the purchaser and the manufacturer

The requirements given in this standard are for guidelines and notwithstanding the requirements to be fulfilled by the purchasers and the manufacturers in accordance with any Statutory Acts, Rules, Regulations or otherwise specified by other Authorities.

This standard is expected to provide uniform practice to be adopted by the purchasers and the manufacturers of such ship unloaders.

For structural requirements of ship unloaders a reference may be made to Indian Standard Bulk handling equipment — Mobile continuous type — Rules for the design of structures (*under preparation*).

In the preparation of this standard, reference was made to the publication on Heavy Lifting Appliances — Rules for the Design of Hoisting Appliances by Federation Europeenne De La Manutention.

Indian Standard

BULK HANDLING EQUIPMENT — SHIP UNLOADER — GANTRY MOUNTED GRAB TYPE — CODE OF PRACTICE FOR DESIGN, MANUFACTURE AND ERECTION

PART 2 ELECTRO-MECHANICAL REQUIREMENTS

1 SCOPE

1.1 This Indian Standard covers electro-mechanical requirements, inspection and testing requirements relating to the design, manufacture, and erection of gantry mounted grab type ship unloader provided with horizontal boom and grab-bucket.

2 GENERAL

2.1 The unloader shall be complete with all electrical accessories required for its safe, smooth and efficient operation.

2.2 Only non-hygroscopic materials shall be used for insulation.

2.3 Electrical system offered shall be suitable for the power supply system fault level at that point.

2.4 Electrical installation work shall be carried out through licensed electrical contractors, holding valid contractor's licences issued by the concerned Statutory Authority.

3 ENCLOSURES

3.1 All electrical equipments shall be properly enclosed or protected to suit the environmental conditions and to prevent inadvertent or accidental contact.

3.2 All enclosures shall preferably be of cast iron, or cast aluminium; wherever sheet steel has to be used, the thickness of the metal shall not be less than 2 mm.

3.2.1 All joints in enclosures shall be made dust-proof by gaskets of high quality non-deteriorating rubber or other suitable material.

3.3 Bare conductors, if used as bus wires, shall be located so as to prevent any form of accidental contact. The execution shall ensure complete safety and wherever necessary metallic screens shall be employed.

3.4 Flame proof/increased safety enclosures shall be provided for electrical equipments wherever required.

3.5 Wherever it is necessary for an electrical equipment to be adjusted or inspected while in service, necessary clearances from live parts may be provided to ensure safety in operation.

3.6 All enclosures of electrical equipments shall be given two coats of anti-corrosive epoxy paint over two coats of primer suitable for epoxy.

3.7 Various control gears like contactors, relays, control transformers, etc, shall be housed in dust proof, damp proof and vermin proof protective panels having doors interlocked with the supply control switches. Space heaters shall be provided for the panels.

4 POWER SUPPLY ARRANGEMENTS

4.1 Power supply shall be controlled by a shore-based circuit breaker on the wharf, from which power shall be taken to the unloader through suitable collector systems like spring-loaded motor operated cable reeling drum etc.

4.2 It shall be possible to trip the shore-based circuit breaker from the machinery house of the unloader.

4.3 Circuit breaker to isolate the main supply to the unloader shall be provided in the machinery house. It shall be possible to switch off this breaker from the operator's cabin also.

4.4 A plug and socket arrangement shall be provided at the shore circuit breaker to connect up the unloader's current collecting arrangements (power and control).

4.4.1 The plug and socket for power shall interlock so that the plug shall be withdrawn only when the circuit breaker is 'OFF'.

4.5 External control links shall be taken out of the unloader using a current collection system similar to that for power. This system may carry the communication links also.

5 POWER TRANSFORMERS

5.1 Power transformers if provided shall be dry type. These shall have overload, voltage and temperature protection.

6 MOTORS

6.1 To select a motor the following shall be established:

- a) The maximum torque required to produce motion in the most unfavourable case.

- b) That it shall allow the unloader to perform its normal duty without abnormal wear.

6.2 A/C motors shall be of totally enclosed, fan-cooled, weather protected, hose-proof design (IP-55 degree of protection) with at least class B insulation and shall be suitable for crane duty.

6.2.1 A/C motors shall have thermistor, overload and short circuit protection.

6.3 D/C motors shall have at least IP-23 enclosure and shall be housed indoor.

6.4 The motors shall have at least the following cyclic duty factors:

Grab hoisting/closing	60 percent
Trolley travel	60 percent
Other motions	40 percent

6.4.1 Motors shall have built-in thermistors with alarm, and also space heater elements.

6.5 Thyristor drives if provided shall have current limitation, speed limitation, overload protection, short-circuit protection and fuse protection.

7 RESISTORS

7.1 Resistors if provided shall be intermittent-rated for Class IV duty and shall be suitable for the climatic conditions and the corrosive atmosphere described elsewhere. Stainless steel resistance grids are preferred.

8 BRAKES

8.1 Electro-mechanical/electro-hydraulic brakes of adequate capacity shall be provided for all motions/motors, in addition to emergency brakes for hoist hold, and hydraulic rail clampers. All brakes shall be of fail-safe type. Smooth braking shall be ensured for hoisting and trolley travel.

9 CABLES

9.1 All power cables shall be PVC insulated, armoured and PVC sheathed preferably with copper conductor. All control cables shall be 2.5 mm² copper.

9.2 Power and control cables shall be protected with HRC fuses/circuit breakers.

9.3 The sizes of the cables shall be so chosen that they are rated to carry the full load current continuously after allowing for necessary de-rating factors for the conditions of installation, and also so that the voltage drop in cables shall not exceed 2.5 percent during running.

9.4 All cables shall be neatly clamped at suitable intervals. All fixing materials shall be given suitable anti-corrosive paint.

9.5 All cables shall be terminated by suitable cable glands.

9.6 Metallic conduits shall be provided wherever necessary for the protection of the cables.

9.7 Power and control circuits to the cab shall be by a festoon cable system.

9.8 Electrical circuits may be printed/painted/pasted at the inside of control cable covers.

10 EARTHING

10.1 The unloader shall be earthed through shoes rubbing on the rails. In addition, the connection between the shore-based circuit breaker and the unloader shall have a fourth conductor to be used as an earth connection. This earth connection shall be linked to the earth connection of the shore-based circuit breaker.

10.2 Double earthing shall be provided for all equipments.

11 LIGHTING

11.1 The unloader shall be provided with suitable illumination to ensure good lighting at all places.

11.2 Flood lights shall be provided at the following points:

- a) On the apron for the operator to see the bucket operation during the night.
- b) In front and rear portions of the unloader to properly light the tracks during unloader travel in the night.

11.3 All lighting circuits shall be protected with HRC fuses and shall be controlled by one main switch-fuse in addition to separate circuit control switches.

11.4 Battery operated emergency lights shall be provided at strategic locations. These shall be the automatic type. The light shall automatically come 'ON' when normal power supply fails and shall go 'OFF' automatically when normal supply comes back. The unit shall incorporate a trickle charger for keeping the battery on charge. The battery shall be rated for at least 30 minutes.

11.5 Air-craft warning/obstruction lights shall be provided on the unloader if required by any Statutory Authorities, for which separate battery units (one hour rated) with chargers shall be provided.

11.6 All light fittings shall be mounted on shock absorbers.

11.7 Low voltage plug socket outlets, with hand lamps and sufficient lengths of cables, shall be provided.

12 CONTROLS

12.1 A safe low voltage shall be employed for the controls. This shall be from the secondary winding of an isolating transformer; one terminal

of this supply shall be earthed and the contactor and the relay coils shall be connected to this terminal.

13 INTERLOCKS

13.1 Necessary interlocks for the safe and smooth operation of the unloader shall be provided.

13.2 'Forward' and 'Reverse' contactors shall be interlocked electrically, and preferably mechanically as well.

14 OPERATOR'S CABIN

14.1 Operator's cabin with all necessary controls for performing the various operations shall be located in such a manner as to ensure complete view of the operations.

14.2 Control facilities for the following are recommended to be provided in the operator's cabin:

- a) Unloader travel — (additional facility shall be provided to carry out operation from the wharf also),
- b) Trolley travel,
- c) Bucket operation,
- d) Cab positioning,
- e) Belt feeder operation,
- f) Cab lighting,
- g) Dust collection equipments, and
- h) An emergency stop button to switch 'OFF' all unloader motions. This shall not interrupt power to the auxiliary circuits, lighting, signals, etc.

14.3 Indication and alarm for main supply, control supply, motions, wind pressure, phase failure, etc.

14.4 The cab shall be fully insulated and shall be equipped with wall-mounted electric motor-driven ventilating fan with gravity type louvres and air filtration arrangement, to ensure sufficient number of changes per hour.

14.5 Windows shall be tinted and shall be arranged to give the operator an unobstructed view of the bucket operation between the hold of the ship and the gantry hopper. Electrically operated wipers for the glass windows shall be furnished to improve visibility during rains.

14.6 There shall be a signal horn controlled from the operator's cabin.

15 PROTECTION

15.1 In case of excessive wind pressure, an alarm shall sound and all motions shall be cut off

and the unloader shall get clamped to rails hydraulically.

15.2 Shunt and series limit switches shall be provided for all motions. The shunt switch shall operate first and if the motion fails to stop, series limit shall act. Additional limit switches shall be provided for long travel, trolley travel, cabin travel, etc.

15.2.1 Instead of shunt and series limit switches, mechanical type end-limit switches and magnetic type pre-limit switches may be provided. The pre-limit switch shall act first to trip the motor and apply mechanical brakes. On reaching the end-limit switch, the breaker on the secondary side of the transformer shall get tripped. For the trolley an additional pre-limit switch shall be provided ahead of the two limit switches mentioned above.

15.3 Phase failure relay shall be provided to trip the main circuit breaker.

15.4 Smoke detector, operation counter, etc, shall be provided.

15.5 A warning bell shall sound automatically during long-travel operation.

16 AIR CONDITIONING

16.1 In the interest of long life and reliable operation, electronic components and other components sensitive to temperature, humidity and dust, shall preferably be located in air conditioned space(s).

17 PRESSURISING

17.1 The electrical machinery house shall be pressurised to keep dust away. The pressure inside shall be 2 mm by water gauge. Air charges per hour shall be 30.

18 LIFT

18.1 An electrically operated lift is recommended.

19 COMMUNICATION FACILITIES

19.1 Inter-communication facility within the unloader structure is recommended.

20 AUTOMATION

20.1 Where considered essential, semi-automation may be provided to reduce physical and psychological stress on the unloader operator. Semi-automation may cover all operations of the grab and the trolley, but not operations inside the hatch. There shall be facility to override the automatic system at any time.

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